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Gregory J. Smith

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THE FEDERAL CIRCUIT'S MODERN DOCTRINE OF EQUIVALENTS IN PATENT INFRINGEMENT

Gregory J. Smith*

In November 1987, the Court of Appeals for the Federal Circuit decided *Pennwalt Corp. v. Durand-Wayland, Inc.*,¹ after rehearing the case en banc.² The Federal Circuit in *Pennwalt*, splitting seven to four, affirmed the district court's finding of no infringement. In doing so, the *Pennwalt* majority approved some rules of analysis under the doctrine of equivalents³ that drew a sharp dissent from Judge Bennett,⁴ a harsh criticism of the majority's

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* Associate, Kirkland & Ellis, Chicago, IL; B.S.E.E., 1986, General Motors Institute, Flint, MI; J.D. with high honors, 1989, George Washington University, Washington, D.C.

1. 833 F.2d 931 (Fed. Cir. 1987) (en banc).

2. *Id.* at 932. The case was first argued before Cowen, Senior Circuit Judge, and Circuit Judges, Bennett and Nies in October 1985. At the suggestion of an active judge not on that panel, the court reconsidered the case en banc. Judge Mayer sat for the rehearing but did not participate in the decision. Not sitting for the rehearing but participating in the decision were Judges Cowen and Bennett, who both were on the panel that first heard the case.

3. In *Pennwalt*, the Federal Circuit for the first time stated that courts should assess equivalence by comparing the accused device with the claim element by element. Before *Pennwalt* expressly approved element-by-element analysis in applying the doctrine of equivalents, courts and commentators had uniformly believed that the claim must be considered as a whole, and that the two modes of analysis were mutually exclusive. See 4 D. CHISUM, PATENTS § 18.04[1] (1989), where Professor Chisum states that "equivalency is still determined by comparing the *claimed* subject matter as a *whole* and the accused device." (emphasis in original).

The Federal Circuit also had indicated that assessing equivalence with respect to individual claim elements is reserved for means-plus-function claims (see 35 U.S.C. § 112, para. 6 (1982)) in *D.M.I., Inc. v. Deere & Co.*, 755 F.2d 1570, 1575 (Fed. Cir. 1985). But the court later applied the claim-as-a-whole concept to means-plus-function claims in *Texas Instruments, Inc. v. International Trade Comm'n*, 805 F.2d 1558 (Fed. Cir. 1986).

This paper does not address section 112 equivalence, but the same basic concepts apply to determine equivalents of either conventional claims or section 112 claims. The key difference between these two types of equivalence is this: Unlike the doctrine of equivalents, section 112 equivalence is a test for literal infringement. Although the means-plus-function claim does cover equivalents of the claimed "means," it does not cover equivalents of the claimed function. Equivalent functions of the means-plus-function claim are covered through the doctrine of equivalents. For a discussion of section 112 equivalence, see *Pennwalt*, 833 F.2d 931 (Fed. Cir. 1987); *Texas Instruments*, 805 F.2d 1558 (Fed. Cir. 1986); *Palumbo v. Don-Joy Co.*, 762 F.2d 969, 974-78 (Fed. Cir. 1985).

4. *Pennwalt*, 833 F.2d at 939 (Bennett, J., dissenting).

statements from Judge Newman in a "commentary,"⁵ and a concurring opinion from Judge Nies labelled "additional views."⁶

Pennwalt illustrates a controversy currently plaguing the Federal Circuit. What is the proper role of the doctrine of equivalents in patent infringement cases, and how is the doctrine to be applied? The Federal Circuit's views on the doctrine of equivalents are of profound importance not only to patent lawyers, but also to the business community.⁷ The Federal Circuit is presently unable to express a coherent view on the doctrine of equivalents. This inability creates a question whether the Federal Circuit will fulfill one of its primary purposes: to expound a uniform and consistent body of patent law.⁸

This paper focuses on how the Federal Circuit applies the doctrine of equivalents and the accompanying doctrine of prosecution history estoppel.⁹ Because the Federal Circuit is now the primary expositor of the patent law, Part I presents only a brief discussion of the (pre-Federal Circuit) origin and historical purpose of the doctrine of equivalents.

Part II examines how the court assesses equivalence as a factual matter, and distinguishes equivalence from infringement by equivalents. This section attempts to reconcile seemingly conflicting statements by the Federal Circuit. On one hand, the court intimates that, in assessing equivalence, triers of fact must view the patent claim "as a whole." On the other hand, the Federal Circuit offers that a court may properly analyze equivalence "claim-element-by-claim-element." Part II determines that both viewpoints reflect the Federal Circuit's shift away from the traditional equitable view that emphasizes the "heart" of the invention, and toward the view that emphasizes the boundaries of the invention. In addition, Part II concludes that the Federal Circuit is evolving beyond the position that courts should invoke the equivalence doctrine only when the equities

5. *Id.* at 954 (Newman, J., commentary).

6. The opinions break down as follows: the majority opinion was written by Judge Bissell, who was joined by Chief Judge Markey, and Judges Friedman, Rich, Davis, Nies, and Archer. Judge Bennett filed a dissent-in-part in which Judges Cowen, Smith and Newman joined. Judge Nies filed additional views (concurrence), and Judge Newman filed a commentary (dissent). The dissent accused the majority of ignoring Supreme Court precedent and overruling "sub silentio" many prior Federal Circuit decisions. *Pennwalt*, 833 F.2d at 939-54 (Bennett, J., dissenting); *id.* at 954-75 (Newman, J., commentary).

7. See *The New High-Tech Battleground*, N.Y. Times, July 3, 1988, § 3, at 1, col. 6 (discussing how consistency in the patent law has increased technological and patent activity).

8. See H.R. REP. NO. 97-312, 97th Cong., 1st Sess. 20-23 (1981).

9. Prosecution history, or "file wrapper," estoppel: the patentee cannot extend the claim through equivalents to cover subject matter that the patentee surrendered during prosecution to obtain the patent. See *Loctite Corp. v. Ultraseal Ltd.*, 781 F.2d 861, 870 (Fed. Cir. 1985).

of the particular case at hand so dictate. Rather than instructing lower courts to expand patent claims through equivalence only to prevent pirates from stealing the heart of the invention, the Federal Circuit is indicating that courts should use the doctrine of equivalents as a common-sense tool to expand the literal scope of claims in any case, regardless of the equities.

Part III analyzes some recent decisions in the doctrine of prosecution history estoppel and examines a trend toward diminishing the claim-limiting effects of this companion doctrine to the doctrine of equivalents. Part III also observes the rarity in which prosecution history estoppel completely forecloses the doctrine of equivalents. Accordingly, this section concludes that regardless of prosecution history estoppel's effects, trial courts should thoroughly assess equivalence on the record to avoid a remand and the resulting piecemeal dispute resolution.

Part IV revisits the history of the doctrine of equivalents and notes that the custom of requiring trial courts to assess equivalence adds to the complexity and expense of patent litigation. But, this practice better promotes the patent system if made available to all patentees, not just those confronting an unscrupulous copyist. As a final point, Part IV notes that the trend toward certainty in the doctrine of equivalents—seen as a claim-limiting trend—is balanced by the concurrent trend to lessen the effects of prosecution history estoppel—a claim-enlarging trend.

I. THE HISTORY AND PURPOSE OF THE DOCTRINE OF EQUIVALENTS

Courts do not apply the doctrine of equivalents in every patent infringement case. Rather, courts must first assess literal infringement, and, only if there is no literal infringement, may the court proceed to the doctrine of equivalents.¹⁰ Even though there is no lit-

10. *Graver Tank & Mfg. Co. v. Linde Air Prods. Co.*, 339 U.S. 605, 608 (1950). Although some courts have stated that the patentee must show some special equitable need for invoking the doctrine, *see, e.g., In re Certain Steel Toy Vehicles*, 197 U.S.P.Q. (BNA) 873, 883-84 (C.C.P.A. 1978), the modern view is that when the basic test of equivalence is met, the court must find infringement by equivalents, whatever the equitable balance. *Durango Assoc. v. Reflange, Inc.*, 843 F.2d 1349, 1359 (Fed. Cir. 1988) (remanded for analysis under doctrine of equivalents though equities not mentioned); *ZMI v. Cardiac Resuscitator Corp.*, 844 F.2d 1576, 1581-82 (Fed. Cir. 1988) (applied doctrine—although infringement not found—without mentioning equitable justifications); *Hi-Life Prods. v. American Nat'l Water-Mattress Corp.*, 842 F.2d 323, 325-26 (Fed. Cir. 1988) (remanded for doctrine of equivalents analysis; no mention of equities). *Cf. Harris, Three Ambiguities of the Doctrine of Equivalents in the Federal Circuit*, 69 J. PAT. OFF. SOC'Y 91, 92 n.4 (1987). *See also infra* note 38.

eral infringement, the court might nonetheless find infringement under the judicially-devised doctrine of equivalents.¹¹ According to this doctrine, a structure or process infringes a patent claim if the structure or process performs substantially the same function in substantially the same way to obtain the same result as does the claimed structure or process as a whole.¹²

The doctrine of equivalents developed during a time when courts placed little emphasis on the language of a patent's claims when determining the scope of the patent's protection.¹³ The United States Supreme Court devised the doctrine of equivalents in *Winans v. Denmead*¹⁴ to prevent form—the actual claim language—from denying patent protection to the substance of the invention.¹⁵ In *Winans*, the court presumed that the inventor intended to protect the “whole” invention regardless of the particular claim language;¹⁶ therefore, the *Winans* Court construed the patent specification liberally as the true measure of protection.¹⁷

The Patent Act of 1870¹⁸ came after *Winans v. Denmead* and made claim language more important.¹⁹ Although the Supreme Court relied more heavily on the language of the patent claim to determine infringement, the doctrine of equivalents still provided a release from the claim's confines in appropriate circumstances.²⁰

The Supreme Court last discussed the doctrine of equivalents in the seminal case of *Graver Tank & Manufacturing Co. v. Linde Air Products Co.*²¹ The *Graver Tank* Court observed that in some situations it would be unfair to place too much emphasis on literal claim language:

[T]o permit imitation of a patented invention which does not copy every literal detail would be to convert the patent grant

11. *Graver Tank*, 339 U.S. at 607-08.

12. *Id.* at 608 (quoting *Sanitary Refrigerator Co. v. Winters*, 280 U.S. 30, 42 (1929)).

13. See 4 D. CHISUM, *supra* note 3, § 18.02[1-2]; *Pennwalt Corp. v. Durand-Wayland, Inc.*, 833 F.2d 931, 957-64 (Fed. Cir. 1987) (Newman, J., commentary).

14. 56 U.S. (15 How.) 338 (1853).

15. “[I]t is the duty of courts and juries to look through the form for the substance of the invention . . .” *Id.* at 342-43.

16. *Id.* at 341-42.

17. *Id.*

18. Patent Act of 1870, ch. 230, 16 Stat. 198 (1870).

19. See 2 D. CHISUM, *PATENTS* § 8.02[2] (1989); *Pennwalt Corp. v. Durand-Wayland, Inc.*, 833 F.2d 931, 959 (Fed. Cir. 1987) (Newman, J., commentary); *Merrill v. Yeomans*, 94 U.S. 568 (1877) (discussing the importance to the patent system of clear and precise claims).

20. *Pennwalt*, 833 F.2d at 959 (Newman, J., commentary). See also 4 D. CHISUM, *supra* note 3, § 18.02[2].

21. 339 U.S. 605 (1950).

into a hollow and useless thing. Such a limitation would leave room for—indeed encourage—the unscrupulous copyist to make unimportant and insubstantial changes and substitutions in the patent which, though adding nothing, would be enough to take the copied matter outside the reach of law. One who seeks to pirate an invention, like one who seeks to pirate a copyrighted book or play, may be expected to introduce minor variations to conceal and shelter the piracy. Outright and forthright duplication is a dull and very rare form of infringement. To prohibit no other would place the inventor at the mercy of verbalism and would be subordinating substance to form. It would deprive him of the benefit of his invention and would foster concealment rather than disclosure of inventions, which is one of the primary purposes of the patent system.²²

Although both Justice Black's and Justice Douglas' dissents in *Graver Tank* argued that the prior art and the specification limited the range of equivalents to which the claims could expand,²³ the *Graver Tank* majority did not acknowledge any such limitations. *Graver Tank* dealt solely with the factual, practical question of equivalence in view of the technology and the prior art, and did not consider prosecution history estoppel. The *Graver Tank* Court reiterated the classic statement of the doctrine of equivalents: the accused product is equivalent to the patented invention "if it performs substantially the same function in substantially the same way to achieve the same result."²⁴

II. DETERMINING EQUIVALENCE: THE FACTUAL LIMITS OF THE DOCTRINE OF EQUIVALENTS

The doctrine of equivalents is constrained by various "legal limits," the prior art and prosecution history estoppel.²⁵ However, factual limits also exist for the doctrine of equivalents. That is, the patentee's claim of infringement might fail because the accused device simply is not a practical equivalent of the patented invention under the *Graver Tank* test. This section of the paper examines how the Federal Circuit determines the factual limits of the doctrine of equivalents. How does the court assess equivalence between the in-

22. *Id.*

23. *Id.* 616-18 (Black, Douglas, J.J., dissenting).

24. *Id.* at 608 (quoting *Sanitary Refrigerator Co. v. Winters*, 280 U.S. 30, 42 (1929)).

25. The prior art and prosecution history estoppel are legal limits because the court construes their effect as a question of law. For a discussion of these legal limits, see *infra* Part III of this article.

vention and accused device as a practical, technical matter? The court's mode of analysis is of particular interest. Does the Federal Circuit assess equivalence element by element or does it consider only the claim as a whole? How do these two concepts differ?

A. *Claim-as-a-Whole vs. Element-by-Element Analysis: Perkin-Elmer, Hughes, Pennwalt*

The *Graver Tank* "same-same-same" statement²⁶ expands a patent claim to its broadest possible scope under the doctrine of equivalents. Because the patent's prosecution history played no role in *Graver Tank*, the claim in that case was extended to the full range of what those skilled in the art would recognize as practical equivalents.²⁷ The Supreme Court in *Graver Tank* stated that determining equivalence is a factual inquiry and advised courts to use experts, texts and treatises, and prior art in determining equivalence.²⁸ But, *Graver Tank* did not advise courts whether the equivalence determination is best undertaken by considering the claim "as a whole," or by comparing the claim "element by element" with the accused device. This issue sparked the Federal Circuit's quarrel in *Pennwalt*.

But even before *Pennwalt*, the Federal Circuit signaled that a conflict loomed in *Perkin-Elmer Corp. v. Westinghouse Electric Corp.*²⁹ *Perkin-Elmer* illustrates the factual limits of the doctrine of equivalents (within the context of the "clearly erroneous" standard of review imposed by Federal Rule of Civil Procedure (FRCP 52(a))). The district court in *Perkin-Elmer* found non-infringement because the accused device differed in structure and operation from two clauses of the claim (the interpretation of which was not dis-

26. See *supra* text accompanying note 24.

27. *Graver Tank*, 339 U.S. at 609-11.

28. *Id.* at 609-10. See also *Pennwalt Corp. v. Durand-Wayland, Inc.*, 833 F.2d 931, 936-38 (Fed. Cir. 1987) (relying on expert testimony); *Hughes Aircraft Co. v. United States*, 717 F.2d 1351, 1364-65 (Fed. Cir. 1983). A useful guide in applying the *Graver Tank* test is "whether persons reasonably skilled in the art would have known of the interchangeability of" a part or parts of the accused device with the corresponding part or parts of the claimed device. *Graver Tank*, 339 U.S. at 609; *Lockheed Aircraft Corp. v. United States*, 553 F.2d 69, 82 (C.C.P.A. 1977). The question of equivalence is determined as of the time of the infringement. *Atlas Powder Co. v. E.I. Du Pont de Nemours & Co.*, 750 F.2d 1569, 1581 (Fed. Cir. 1984). See also *Datascope Corp. v. SMEC, Inc.*, 776 F.2d 320, 326 (Fed. Cir. 1985) (" '[A]n embellishment' made possible by technological advances may not permit an accused device to escape 'the web of infringement.' "); *Hughes*, 717 F.2d at 1365.

29. 822 F.2d 1528 (Fed. Cir. 1987). As she later did in *Pennwalt*, Judge Newman dissented in *Perkin-Elmer* and complained that the majority had ignored controlling precedent by failing to consider the claim as a whole. *Id.* at 1535, 1536 (Newman, J., dissenting).

puted).³⁰ The claim required "tap coupling" whereas the accused device used "loop coupling." The trial court found that the two types of coupling could not be equivalents, because they were substantially different ways of achieving a common result.³¹

Chief Judge Markey reviewed the trial court's findings and first noted that equivalence is a finding of fact reviewable under the "clearly erroneous" standard of FRCP 52(a).³² The Federal Circuit affirmed the finding of non-infringement because, even though the claimed and accused devices possibly performed the same function to achieve the same result, the lower court's finding that they did so in substantially different ways was not clearly erroneous.³³

Similar to *Graver Tank*, the claim in *Perkin-Elmer* was expanded to its broadest possible scope. In *Perkin-Elmer*, as in *Graver Tank*, the patent's prosecution history played no role in the court's analysis of equivalents. However, unlike *Graver Tank*, *Perkin-Elmer* did not result in a finding of infringement by equivalents. The patent claim at issue in *Perkin-Elmer*, even given its most expansive interpretation, could not encompass the accused device because of the factual limits on the doctrine of equivalents.³⁴

1. *Perkin-Elmer Explained the Claim-as-a-Whole Statement in Hughes*

In finding those factual limits, the *Perkin-Elmer* court did not place its primary emphasis on viewing the claim as a whole. In *Perkin-Elmer*, the majority's analysis was limited to only two of the ten elements of the claim.³⁵ The *Perkin-Elmer* court so limited its equivalence analysis even though the same judge, Chief Judge Markey, previously ruled that the claim must be viewed "as a whole" in determining equivalence.³⁶ In *Perkin-Elmer*, Chief Judge Markey noted that the statement in *Hughes* regarding analysis of the invention as a whole should not be construed as a directive for courts to consider only the invention's "essence" and ignore claim limitations in applying the doctrine of equivalents.³⁷

30. *Id.* at 1530.

31. *Id.* at 1529-35.

32. *Id.* at 1529.

33. *Id.*

34. *Id.* at 1535.

35. *Id.* at 1530.

36. *Hughes Aircraft Co. v. United States*, 717 F.2d 1351 (Fed. Cir. 1983). After so stating, the *Hughes* court nonetheless proceeded to apply the doctrine of equivalents element by element, paying attention to the role of each element within the claim. *Id.* at 1363-66.

37. *Perkin-Elmer*, 822 F.2d at 1532-33 n.8.

The *Perkin-Elmer* court acknowledged statements in other cases concerning the appropriateness of considering the "essence," the "gist," or the "heart" of the invention in applying the doctrine of equivalents,³⁸ citing *Loctite Corp. v. Ultraseal Ltd.*,³⁹ *Atlas Powder Co. v. E.I. Du Pont de Nemours & Co.*,⁴⁰ and *Medtronic, Inc. v. Cardiac Pacemakers, Inc.*⁴¹ Nevertheless, in *Perkin-Elmer*, Chief Judge Markey characterized those statements as dicta, and reemphasized that claim limitations are not to be regarded as immaterial or

38. Viewing the claim as a whole and considering the heart of the invention are distinct and opposing concepts. See, e.g., *Interconnect Planning Corp. v. Feil*, 774 F.2d 1132 (Fed. Cir. 1985) (In determining 35 U.S.C. § 103 non-obviousness, there is no legally protectable "essence" of the invention; rather, the court must consider the claim in its entirety, or as a whole.). Considering the heart of the invention is an outdated and obsolete way to identify and define intellectual property. See *Pennwalt Corp. v. Durand-Wayland, Inc.*, 833 F.2d 931, 957-59 (Fed. Cir. 1987) (Newman, J., commentary) (discussing the historical transition from core claiming to perimeter claiming: "patent claims no longer merely claim the salient features, the 'heart' of the invention"). See generally 2 D. CHISUM, *supra* note 19, § 8.02[1-3] (discussing historical development of patent claims).

The "heart of the invention" concept grows out of the "equitable" nature of the doctrine of equivalents. *Graver Tank* emphasized that the doctrine is an important tool for patentees to prevent infringers from stealing the "benefit" of the invention. *Graver Tank & Mfg. Co. v. Linde Air Prods. Co.*, 339 U.S. 605, 607-08 (1950). Other older cases refer to the "substance" of the invention. See, e.g., *Winans v. Denmead*, 56 U.S. (15 How.) 229 (1853); *Burr v. Duryee*, 68 U.S. (1 Wall.) 531 (1864).

Similarly, courts have in the past held that the patentee must lay some equitable foundation—for example, the patent covers a pioneer invention or defendant has stolen the heart of the invention—before the doctrine of equivalents can be applied. See, e.g., *In re Certain Steel Toy Vehicles*, 197 U.S.P.Q. 873, 883-84 (C.C.P.A. 1978). Cf. *Coleco Indus., Inc. v. United States Int'l Trade Comm'n*, 573 F.2d 1247, 1258 (C.C.P.A. 1978) (Rich, J., joined by Markey, C.J., concurring) ("The doctrine [of equivalents] is an exception to the rule that patentees are limited to what they claim and is not applied in every case.").

Even though *Graver Tank* implied that the doctrine of equivalents is merely a shield protecting patentees from shrewd technology thieves, the doctrine has evolved as much more than that. *Graver Tank's* discourse on the evils of the "unscrupulous copyist" is really a warning of what would happen if we did not have the doctrine of equivalents, not a rule that the doctrine may only be applied against pirates—willful infringers. The practice today is to follow the majority in *Coleco* and apply the doctrine of equivalents routinely after finding no literal infringement. The patentee need not lay any equitable foundation to expand the claim through the doctrine of equivalents. See, e.g., *Hughes*, 717 F.2d at 1361, 1363, where even though the court acknowledged the doctrine's equitable character, it did not require the patentee to lay an equitable foundation to justify invoking the doctrine. Thus the "heart," "essence," and "gist" of the invention are concepts of "equity" relating to a discarded view of the doctrine of equivalents; as such, they are no longer useful in analyzing doctrine of equivalents issues.

39. 781 F.2d 861, 872 (Fed. Cir. 1985).

40. 750 F.2d 1569, 1582 (Fed. Cir. 1984).

41. 721 F.2d 1563, 1567 (Fed. Cir. 1983). See also *Coleco Indus.*, 573 F.2d at 1258 (Rich, J., joined by Markey, C.J., concurring, but disagreeing with the majority's use of the doctrine of equivalents: "[N]o basis has been laid for [the doctrine's] application by showing, for example, . . . that appellees have appropriated the essence of the invention." (emphasis in original)).

insignificant in determining infringement.⁴² Thus, *Perkin-Elmer*, written by the same judge who wrote *Hughes*, explained that under *Hughes*, the court may compare the claim with the accused device "element by element," but also must view each claim limitation in the context of the entire claim.⁴³

2. *The Perkin-Elmer Dissent and the "Heart" of the Invention: Obsolete Ways of Defining the Scope of Patent Protection*

Judge Newman's dissent in *Perkin-Elmer* was an early sign of the storm clouds gathering in the Federal Circuit that would erupt in the *Pennwalt* decision. Judge Newman criticized the majority's focus on only two specific claim elements rather than the invention as a whole. Judge Newman called the majority's consideration of only two of the ten elements "improper claim analysis."⁴⁴ Judge Newman also accused the majority of rewriting *Hughes* according to how they would prefer to have written it,⁴⁵ and of categorizing, in footnote 8, "much of [the Federal Circuit's] jurisprudence as 'dicta.'"⁴⁶

Admittedly, regarding the technical "tap coupling/loop coupling" issue in *Perkin-Elmer*, Judge Newman might have the better of the argument. But Judge Newman's legal arguments regarding the doctrine of equivalents are conclusory, unsupported and unsupportable for at least three reasons. First, the statements distinguished by the *Perkin-Elmer* majority as dicta (the statements from *Loctite*, *Atlas Powder*, and *Medtronic*) are references to an obsolete con-

42. *Perkin-Elmer*, 822 F.2d at 1532-33 n.8. *Accord* *Lemelson v. United States*, 752 F.2d 1538, 1551 (Fed. Cir. 1985) (stating that "[i]t is . . . well settled that each element of a claim is material and essential, and that in order for a court to find infringement, the plaintiff must show the presence of every element or its substantial equivalent in the accused device"). In *Lemelson*, which was decided after *Hughes*, and in fact cites *Hughes*, the accused device lacked the single claim element of "manipulation means" or its equivalent. Based solely on this finding, the Federal Circuit affirmed the district court's finding of non-infringement under the doctrine of equivalents. *Id.* at 1551.

43. *Perkin-Elmer*, 822 F.2d at 1532-35 nn.3-5. In assessing equivalence, the court should consider the purpose the limitation serves within the patent, its characteristics when combined with the other elements or limitations of the claim, and the intended functions of the element or limitation. *See, e.g.*, *Graver Tank & Mfg. Co., v. Linde Air Prods. Co.*, 339 U.S. 605, 609 (stating that the court must consider an ingredient's purpose, qualities, and function in the patent).

44. *Perkin-Elmer*, 822 F.2d at 1539 (Newman, J., dissenting) (citing *Hughes Aircraft Co. v. United States*, 717 F.2d 1351, 1364 (Fed. Cir. 1983), and *Martin v. Barber*, 755 F.2d 1564, 1568 (Fed. Cir. 1985)).

45. *Id.* at 1536. This complaint is somewhat curious considering that both *Hughes* and *Perkin-Elmer* were written by the same judge, Chief Judge Markey.

46. *Id.* at 1544.

cept,⁴⁷ and are, in fact, dicta.⁴⁸ Consider the context in which the statements were made. In both *Medtronic* and *Loctite*, the court discussed both the doctrines of equivalents and obviousness under 35 U.S.C. § 103, and stated that there is no legally recognizable "essence," "heart," or "gist" of the invention; rather, the invention must be considered "as a whole."⁴⁹ In *Atlas Powder*, the Federal Circuit, noting that the district court had considered the heart of the invention merely as a supplement to its *Graver Tank* analysis, simply mentioned that the heart-of-the-invention analysis did no real harm.⁵⁰ In none of these three cases did the court rely on its heart-of-the-invention analysis for the holding.

Second, *Martin v. Barber*,⁵¹ cited in Judge Newman's dissent, does not support the "claim as a whole" argument. To the contrary, *Martin* stated that where an element is changed to avoid infringement, "it is appropriate to consider, in assessing equivalence, whether the changed element operates in substantially the same way as the claimed element"⁵²

Third, in addition to its two-element approach the *Perkin-El-*

47. See *supra* note 38.

48. More troublesome than any of these three statements is a different statement in *Loctite*, neither distinguished by the majority nor cited by the dissent in *Perkin-Elmer*, that the prosecution history would not necessarily prevent the district court from assessing equivalence on remand, in part "because [defendant] may be using the most important aspect if not the gist of [plaintiff's] inventions." *Loctite Corp. v. Ultraseal Ltd.*, 781 F.2d 861, 871 (Fed. Cir. 1985) (emphasis added).

That statement is best explained by observing that in *Loctite*, the finding that the defendant had taken the "gist" of the invention simply meant that a finding of infringement by equivalence would be appropriate. *Loctite* did not say that the defendant's taking of the "gist" of the invention would mandate a finding of infringement by equivalence. Nor did it say that such a finding is a prerequisite to applying the doctrine.

The "heart" of the invention has been defined as the "crucial teaching" of the patent. See *Weidman Metal Masters v. Glass Master Corp.*, 623 F.2d 1024, 1030 (5th Cir. 1980), *cert. denied*, 450 U.S. 982 (1981). In the context of the claim, the "heart" or "essence" or "gist" thus can be thought of as the key element or characteristic that makes the invention different from all that was known before it. Whatever else taking the "heart" of the invention means, a defendant does not infringe by taking the "heart" of the claimed invention without taking the other elements or their equivalent. *Perkin-Elmer*, 822 F.2d at 1532-33 n.8.

49. *Medtronic, Inc. v. Cardiac Pacemakers, Inc.*, 721 F.2d 1563, 1567 (Fed. Cir. 1983); *Loctite*, 781 F.2d at 872. In *Medtronic*, Chief Judge Markey stated that it is appropriate to consider the heart of the invention in applying the doctrine of equivalents. *Medtronic*, 721 F.2d at 1567. And previously in *Hughes*, the same judge wrote that it is error not to consider the invention as a whole in assessing equivalence. *Hughes*, 717 F.2d at 1364. Combining *Medtronic* and *Hughes*, it is permissible to consider the "heart" of the claim, and it is mandatory to view the "claim as a whole" under the doctrine of equivalents.

50. *Atlas Powder Co. v. E.I. Du Pont de Nemours & Co.*, 750 F.2d 1569, 1582 (Fed. Cir. 1984).

51. 755 F.2d 1564 (Fed. Cir. 1985).

52. *Id.* at 1564, 1568 (emphasis added).

mer majority did, in fact, consider the claim as a whole.⁵³ In *Perkin-Elmer*, the court justified its focus on only two claim elements by pointing out that those two claim elements were sufficiently different from the corresponding elements of the accused devices to prevent the accused devices, "as wholes," from operating in substantially the same way as the claimed devices—"as wholes."⁵⁴

Indeed, it is not at all unusual for the court to focus on only one or two elements of the claim in assessing equivalence. In *Atlas Powder*, the Federal Circuit affirmed the district court's doctrine of equivalents analysis, even though the district court focused on only one claim element and the single corresponding ingredient in the accused composition to determine equivalence.⁵⁵

Similarly in *Lemelson*, the Federal Circuit, in affirming the district court's finding of non-infringement, focused the equivalence analysis on only one element of the claim.⁵⁶ The question of infringement by equivalence almost invariably boils down to whether some aspect of the accused device is a substantial equivalent of the corresponding limitation or limitations of the claim. There is no rational way to determine equivalence other than with respect to specific claim limitations.

3. *Hughes' Claim-as-a-Whole Concept Refined: Pennwalt v. Durand-Wayland*

The Federal Circuit's brewing controversy over element-by-element analysis under the doctrine of equivalents peaked in *Pennwalt v. Durand-Wayland, Inc.*⁵⁷ The dissent in *Pennwalt* equated element-by-element analysis with requiring one-to-one correspondence between claim elements and corresponding elements of the accused device.⁵⁸ That is not a fair reading of the majority opinion in *Pennwalt*.

The *Pennwalt* court approved the lower court's element-by-element analytic structure.⁵⁹ But the *Pennwalt* court did not hold that it is proper to ignore the context of each claim limitation. And

53. *Perkin-Elmer*, 822 F.2d at 1528. Perhaps, then, element-by-element analysis is perfectly compatible with claim-as-a-whole analysis.

54. *Id.* at 1530 n.5. (emphasis added).

55. *Atlas Powder*, 750 F.2d at 1579-80, *aff'g* 588 F. Supp. 1455 (N.D. Tex. 1983) (restricting analysis under doctrine of equivalents to the "one point of difference between the claims of the Bluhm patent and the Du Pont product . . .").

56. *Lemelson v. United States*, 752 F.2d 1538, 1549-51 (Fed. Cir. 1985).

57. 833 F.2d 931, 935 (Fed. Cir. 1987) (en banc).

58. *Id.* at 946 (Bennett, J., dissenting).

59. *Id.* at 935.

nowhere did the court state that a one-to-one correspondence between claim limitations and elements of the accused device is required to find infringement. In fact, considering *Martin v. Barber* (analysis limited to one element),⁶⁰ *Atlas Powder* (analysis limited to one element),⁶¹ *Hughes* (de facto comparison between claim and accused device element by element),⁶² and *Perkin-Elmer* (analysis limited to two of ten elements),⁶³ *Pennwalt's* approval of an element-by-element analysis under the doctrine of equivalents is hardly remarkable. Furthermore, the concept of viewing the claim as a whole, insofar as it means assessing each limitation in the context of the entire claim, is entirely consistent with an element-by-element analytic structure.⁶⁴

The dissents in *Pennwalt* characterized the majority's opinion as inconsistent with the claim-as-a-whole rule of *Hughes*.⁶⁵ Judge Newman said that the case was "factually on all fours" with *Hughes*,⁶⁶ yet the majority reached a different result than that of *Hughes*—affirmance of the finding of non-infringement.

Did *Pennwalt* overrule *Hughes* "sub silentio," as the dissent

60. 755 F.2d 1564, 1566-68 (Fed. Cir. 1985).

61. 750 F.2d 1569, 1579-80 (Fed. Cir. 1984).

62. 717 F.2d 1351, 1364-66 (Fed. Cir. 1983).

63. 822 F.2d 1528, 1530 (Fed. Cir. 1987).

64. *Hughes*, 717 F.2d at 1363-66. The apocalyptic tone of the dissents in *Perkin-Elmer* and *Pennwalt* suggests that such imprecise formulations as "heart of the invention" and "view the claim as a whole" are not useful for rational and consistent legal analysis. Moreover, considering that often millions of dollars are at stake, and sometimes the very existence of a company employing hundreds (or thousands) of people is in jeopardy, the court perhaps should struggle to develop some mode of analysis more usable and precise than "view the claim as a whole."

As Learned Hand said of the classical statement of the doctrine: "The usual ritual, which is so often repeated and which has so little meaning . . . does not help much in application; it is no more than a way of stating the problem." *Claude Neon Lights, Inc. v. E. Machett & Sons*, 3 U.S.P.Q. (BNA) 220, 222 (2d Cir. 1929), *cert. denied*, 281 U.S. 741 (1930). The courts have justified the lack of usable guidelines for applying the doctrine by stating that it is an equitable doctrine, and to constrain it with rigid rules of application would compromise the court's equitable powers. But that justification evaporates when we consider that the Federal Circuit never applies the doctrine of equivalents by weighing the equities as it does, for example, in considering a preliminary injunction. And rightly so, for patent protection should not depend on something as irrelevant to an invention's breadth and as completely unpredictable as the equitable status of potential infringers. The doctrine of equivalents has for too long remained vague and imprecise. The Federal Circuit should be commended for attempting at least to set up a definite and consistent analytical structure that is useful in applying the doctrine.

65. *Pennwalt*, 833 F.2d at 941 (Bennett, J., dissenting, joined by Cowen, Smith and Newman, J.J.: "*Hughes* . . . is clearly being overruled by the majority . . ."), and at 955 (Newman, J., commentary).

66. *Id.* at 955 (Newman, J., commentary).

claims?⁶⁷ The answer is "no." Admittedly, the two cases share some similarities. In *Pennwalt*, the accused device lacked a single claimed element: "position indicating means."⁶⁸ The prior art cited during prosecution likewise lacked such a means.⁶⁹ Similarly in *Hughes*, the cited prior art and the accused devices both lacked a claim limitation: means for sending the satellite's spatial orientation data to an external location.⁷⁰ Despite the similarities, the two cases reach opposite results.

The divergence between *Pennwalt* and *Hughes* is at least partly attributable to the different standards of review that apply to different district court determinations. In *Hughes*, the Federal Circuit decided as a matter of law that the trial court's "single conclusory paragraph" addressing equivalence failed to meet the legal requirements for a doctrine of equivalents analysis.⁷¹ The Federal Circuit listed several reasons for this decision: (1) the trial judge's demand for "obvious and exact" equivalents was error because such a requirement would emasculate the doctrine of equivalents; (2) the trial judge did not define "obvious or exact equivalent"; (3) the trial judge did not supply reasoned analysis to support the conclusion that the accused devices lacked obvious or exact equivalents of the pertinent elements; (4) the trial judge did not apply the "same-same-same" test of *Graver Tank*; and (5) the trial judge failed to apply the doctrine of equivalents to the claimed invention as a whole.⁷²

Significantly, the *Hughes* court did not reject the trial judge's finding of non-equivalence as clearly erroneous, the standard for reviewing factual findings on equivalence.⁷³ Rather, the *Hughes* court held that the trial judge's doctrine of equivalents analysis was legally insufficient because the judge, by interpreting the prosecution history as requiring "obvious and exact equivalents," applied an improper standard for determining equivalence.⁷⁴

The Federal Circuit in *Pennwalt*, on the other hand, found no such deficiencies in the district court's analysis. The court approved

67. *Id.* at 939-54 (Bennett, J., dissenting).

68. *Id.* at 938.

69. *Id.* at 936-39.

70. *Hughes*, 717 F.2d at 1352-56, 1361.

71. *Id.* at 1363-65.

72. *Id.* at 1363-64.

73. *Id.* at 1363-65.

74. *Id.* At that point, the Federal Circuit could have remanded the case with instructions to apply the correct standard in assessing equivalence. But apparently the court was confident in its ability to undertake the factual determination of equivalence based on the record before it.

of the district court's doctrine of equivalents analysis.⁷⁵ Indeed, the trial judge in *Pennwalt*, unlike the trial judge in *Hughes*, analyzed equivalence extensively.⁷⁶

The Federal Circuit in *Pennwalt*, having found the trial court's equivalence analysis legally sound, limited its review to the factual question of infringement—both literal and by equivalents—under the “clearly erroneous” standard of Federal Rule of Civil Procedure 52(a).⁷⁷ In contrast, the *Hughes* court, finding legal error in the trial judge's equivalence analysis, made its own factual determination of equivalence based on inferences from the record on appeal and reached a different factual conclusion.⁷⁸

B. *The Modern Trend: Away From the Equities*

Hughes and *Pennwalt* are not in irreconcilable conflict, and as observed earlier, claim-as-a-whole and element-by-element analyses are compatible. Both are concepts that move away from the obsolete “heart” of the invention idea.

The “equitable” nature of the doctrine of equivalents has been overplayed, and it has a decidedly hollow ring. Such was the case in *Graver Tank*, and it is still true. Unlike cases finding no infringement, but characteristic of cases finding infringement by equivalence, *Graver Tank* emphasized the “equitable” nature of the doctrine of equivalents.⁷⁹ The *Graver Tank* Court stated that the doctrine of equivalents evolved in response to the tendency of technology pirates to conceal their thievery by making superficial changes to their copy of an invention.⁸⁰ Indeed, to justify its invocation of the doctrine of

75. *Pennwalt*, 833 F.2d at 934-39.

76. Compare *Pennwalt*, 225 U.S.P.Q. (BNA) 558, 568-72 (N.D. Ga. 1984) (“Neither the language of the claims of the patent nor the prior art require that the claims of the patent-in-suit be read to include only those devices that use the components described in the patent-in-suit's claims and specification.”) with *Hughes*, 215 U.S.P.Q. (BNA) 787, 810-12 (Ct. Cl. Tr. Div. 1982) (requiring “obvious and exact equivalents” because “file wrapper estoppel acts to severely limit the range of equivalents to which a claim is entitled”).

77. *Pennwalt*, 833 F.2d at 936.

78. *Hughes*, 717 F.2d at 1364-66. Had the trial court in *Hughes* provided an adequate factual analysis of equivalence, the Federal Circuit could, and presumably would, have reviewed the trial court's findings on equivalence under the clearly erroneous standard, as it did in *Pennwalt*.

In both *Hughes* and *Pennwalt*, the Federal Circuit nevertheless undertook an independent *de novo* review of the patent-in-suit's prosecution history. See *Hughes*, 717 F.2d at 1352-54, 1361-63; *Pennwalt*, 833 F.2d at 937-39. Therefore, the *Hughes* court would have reversed anyway because of its disagreement with the trial judge on the impact of the prosecution history.

79. *Graver Tank & Mfg. Co. v. Linde Air Prods. Co.*, 339 U.S. 605, 607-10 (1950).

80. *Id.* at 607-08.

equivalents, the Court relied heavily on the defendant's apparent status as an "unscrupulous copyist"⁸¹—a factor that is completely irrelevant to determining patent infringement.⁸²

Of what significance is the *Graver Tank* Court's portrayal of the doctrine of equivalents as a rule of equity protecting patentees from "pirates"? Why did the Court emphasize that the defendant developed its product by copying the plaintiff's invention? Perhaps the Court meant to imply that the doctrine of equivalents should be reserved only for cases of willful infringement, i.e., where the defendant is a pirate. If that is the case, then nobody has taken the Court's advice seriously.⁸³ Whatever the meaning of those parts of the *Graver Tank* opinion, the Court overshadowed that meaning by extolling the goodness of the doctrine so eloquently throughout the rest of the *Graver Tank* opinion. At least one of Justice Black's predictions in dissent was accurate: "One need not be a prophet to suggest that today's rhapsody on the virtue of the 'doctrine of equivalents' will . . . make enlargement of patent claims the 'rule' rather than the 'exception.'"⁸⁴

That is not to suggest that the courts' present practice is bad; all patented inventions should be entitled to a fair range of equivalents no matter how culpable the accused infringer. The doctrine of equivalents may be an equitable doctrine, but its application is not controlled by the equities of each case. Consider the patentee confronting two infringers, *A* and *B*, whose products are identical and are equivalents of the claimed invention. Infringer *A* has deliberately stolen the essence of the invention and has made superficial changes to avoid liability. Infringer *B*, on the other hand, spent much time and money to devise its product independently. *B* is an "innocent" infringer; *A* is a "pirate."

In the ensuing lawsuit for patent infringement, if we adhere strictly to the rule that the doctrine "exists solely for the equitable purpose of 'prevent[ing] an infringer from stealing the benefit of an invention,'"⁸⁵ we readily hold *A* liable for infringement by

81. *Id.*

82. See 4 D. CHISUM, *supra* note 3, § 18.02[2] (criticizing *Graver Tank's* reliance on the defendant's imitation of the invention: "One of the major purposes of the patent system is to provide disclosure of technological information for use by the public"), § 16.02[2] (knowledge and intent are not relevant to determining direct infringement). See also *supra* note 38.

83. See *supra* note 38.

84. *Graver Tank*, 339 U.S. at 616 (Black, J., dissenting). That is, courts assess infringement by equivalence now as a routine step in patent infringement cases. See *supra* note 28.

85. *Texas Instruments, Inc. v. International Trade Comm'n*, 805 F.2d 1558, 1572

equivalents. The equitable considerations are obvious. But what about *B*? The equities really seem to favor *B*, the innocent infringer. Applying the doctrine of equivalents to hold *B* liable would not prevent an infringer from stealing; it would punish an innocent party whose hard work and financial investment unfortunately happened to yield an infringing product. Balancing the equities, *B* would not be liable.

Such a result is absurd and unfair to patentees; the inventor has a statutory right to exclude all others from making, using, or selling what the inventor has discovered. Every inventor is entitled to a fair, common-sense assessment of the invention's scope as determined primarily by the claims and the prior art.

Inventors should be able to use the doctrine of equivalents to expand constrained, literal claim language into a more common-sense definition of the scope of protection because of the nature of inventions and intellectual property. Inventions are, by definition, something "new under the sun," and intellectual property is an intangible and elusive concept. Volumes could be written to describe and define a single invention and its intellectual property content.⁸⁶ But to make the patent system workable, the invention and its intellectual property boundaries must be defined in a single sentence: the claim. The claim makes the patent system workable, but it is inherently inadequate for its function and presents somewhat of a hardship to inventors.⁸⁷ The doctrine of equivalents balances this hardship. To treat the doctrine as a truly equitable tool, and thus make its availability depend on the equities of individual cases, would be unfair to patentees. For the doctrine of equivalents really to be an "equitable" doctrine, it should not be applied according to individual equities. Rather, the doctrine of equivalents should be available to all patentees.

This conclusion means that the Federal Circuit no longer can decline to enunciate usable guidelines for applying the doctrine. The court cannot brush off its responsibility to make rules of patent law by referring to the doctrine of equivalents' equitable nature, quoting a few lines from *Graver Tank*, and announcing its decision. The court must guide lower courts, businessmen, and lawyers in applying the doctrine of equivalents. Perhaps *Pennwalt* signals the Federal

(Fed. Cir. 1986) (quoting *Graver Tank*, 339 U.S. at 608). Statements in this vein are standard boilerplate for Federal Circuit decisions on the doctrine of equivalents.

86. Indeed, some patents, coupled with their prosecution history, are quite voluminous.

87. It normally takes over a year and costs thousands of dollars to obtain allowance of a submitted claim.

Circuit's willingness to move in this direction.

As the Federal Circuit discovers that the doctrine of equivalents is an anomaly, an "equitable doctrine" unguided by equities, it can begin to set up some definite analytical framework through which the courts can apply the doctrine consistently. Thus, the doctrine evolves as a common-sense tool of claim construction. The doctrine of equivalents gives full patent protection to all patentees, not just those with the equities on their side.

II. PROSECUTION HISTORY ESTOPPEL

Although not at issue in *Graver Tank*, the prior art and the prosecution history, both applied as questions of law, can impose limits on the broad claim scope available under the *Graver Tank* formulation.⁸⁸ By definition, a patent claim cannot cover subject matter in the prior art. Similarly, if a patentee has obtained patent protection by stating that a patent claim does not cover subject matter X, then the claim cannot cover X, even if X and the invention are plainly "equivalent" from the perspective of the person of ordinary skill in the art. These are the legal limits imposed on the doctrine of equivalents.

A. *Prosecution History Estoppel Is Not a Bar to the Doctrine of Equivalents*

The prosecution history affects claim scope in two ways. First, it aids the court in construing the claims before determining literal infringement, and second, by yielding prosecution history estoppels, it limits the doctrine of equivalents after the court finds no literal infringement.⁸⁹

As a practical matter, one may question whether such a distinction is necessary. After all, why not simply analyze the prosecution history once and be done with it? The issue was decided in *Coleco Industries v. United States International Trade Commission*,⁹⁰ where the majority held that upon a finding of no literal infringement, the court should apply the doctrine of equivalents as a matter

88. See *Loctite Corp. v. Ultra Seal Ltd.*, 781 F.2d 861, 870-71 & n.7 (Fed. Cir. 1985).

89. *Id.* at 870. See also *Fromson v. Advance Offset Plate, Inc.*, 720 F.2d 1565, 1571 (Fed. Cir. 1983) (holding that prosecution history estoppel is not relevant if there is literal infringement, but acknowledging that the prosecution history is relevant to the task of construing the claims before analyzing literal infringement).

90. 573 F.2d 1247 (C.C.P.A. 1978).

of course, construing the claims in view of the specification.⁹¹ Then, if the three-prong test of *Graver Tank* establishes equivalency as a technical matter, the prosecution history is analyzed for estoppel.⁹²

That is exactly what the *Coleco* majority did. After finding the accused device to be equivalent under the *Graver Tank* test, the Court of Customs and Patent Appeals in *Coleco* applied prosecution history estoppel to limit the range of equivalents and affirmed the finding of non-infringement.⁹³ Judge Rich, joined by Chief Judge Markey, concurred in the result but scoffed at the majority's "expand-then-contract" method of reaching that result:

If a patentee is estopped by his prosecution history to assert that a claim is broad enough to be infringed by an accused structure . . . it is wasted motion, if not an absurdity, to first apply the doctrine of equivalents to expand the claim 'beyond its literal confines' to cover the structure and in the next breath contract it to its original literal scope.⁹⁴

Possibly Judge Rich's position makes sense given the particular facts of *Coleco*, where, according to Judge Rich, the question of infringement was "clear as day,"⁹⁵ and to suggest even the possibility of equivalence between the invention and the accused device would be "utterly absurd."⁹⁶ But many, if not most cases present very close issues of infringement, especially infringement by equivalents. Ordinarily the trial court should not allow the prosecution history to prevent the court from conducting a thorough factual assessment of equivalence upon finding no literal infringement. Although the prosecution history may operate to limit the range of equivalents to which a claim is entitled, "it is not fatal to application of the doctrine [of equivalents] itself."⁹⁷

The analytical process used by the majority in *Coleco* makes sense. It makes sense because the appellate court is always free to substitute its own interpretation of the prosecution history for that of

91. *Id.* at 1253-54.

92. *Id.* & n.6.

93. *Id.* at 1255-58.

94. *Id.* at 1259 (Rich, J., concurring).

95. *Id.*

96. *Id.* See also *Standard Oil Co. v. American Cyanamid Co.*, 774 F.2d 448, 452-53, 455 (Fed. Cir. 1985) (Rich, J., affirming) (holding no infringement and omitting any consideration of equivalence where the charge of infringement arguably is "baseless").

97. *Hughes Aircraft Co. v. United States*, 717 F.2d 1351, 1363 (Fed. Cir. 1983). See also *Hi-Life Prods., Inc. v. American Nat'l Water-Mattress Corp.*, 842 F.2d 323, 326 (Fed. Cir. 1988) (remanding for a determination of infringement under the doctrine of equivalents because the lower court omitted any such determination).

the trial court. When the appellate court does so, the trial court faces an increased possibility that the appellate court will disagree with the legal standard used by the trial court and remand the case for the trial court to consider equivalence under a "correct" legal standard. The trial court can reduce this possibility by providing the appellate court with a thorough factual assessment of equivalence on the record. If the trial court has assessed equivalence thoroughly, there is no need for a remand because the appellate court itself can apply the proper legal standard to facts already in the record.⁹⁸ In this manner, the courts achieve a measure of judicial economy: the appellate court applies its own interpretation of the prosecution history to the facts at hand and decides the case right then and there, rather than remanding the case or attempting to find facts itself at the appellate court level.⁹⁹ That is probably one reason why in many cases the trial court does assess equivalents as a matter of course after finding no literal infringement.

B. *The Claim-Limiting Effect of Prosecution History Estoppel: The Recent Trend*

Prosecution history estoppel applies both to amendments made to overcome the prior art and to arguments made to obtain the patent.¹⁰⁰ But not all amendments and arguments create estoppels.¹⁰¹ Judge Kashiwa has provided a concise statement of the nature of prosecution history estoppel:

[W]henever the doctrine of file history estoppel is invoked, a close examination must be made as to, not only what was surrendered, but also the reason for such a surrender. The fact that claims were narrowed does not always mean that the doctrine of file history estoppel completely prohibits a patentee from recapturing some of what was originally claimed.¹⁰²

98. This is exactly what the Federal Circuit attempted to do in *Hughes*, but the panel deciding *Hughes* could not agree on how to apply the correct legal standard because the factual record on equivalence was lacking.

99. True, the *Hughes* court saw fit to evaluate expert testimony, 717 F.2d at 1364-65, and to make the factual determination of equivalence in that case, but it is equally true that fact-finding in appellate courts is unreliable, and is also poor policy. Indeed, one of the bases for Judge Davis' dissent in *Hughes* was his disagreement with the majority's factual assessment of equivalence. *Id.* at 1367 & n.2 (Davis, J., dissenting) (quarreling with the majority's evaluation of the expert testimony).

100. *Id.* at 1362-63.

101. *Id.*

102. *Bayer Aktiengesellschaft v. Duphar Int'l Research B.V.*, 738 F.2d 1237, 1243 (Fed. Cir. 1984). See also *Hughes*, 717 F.2d at 1363 ("Depending on the nature and purpose of an amendment, it may have a limiting effect within a spectrum ranging from great to small

Thus, the rules defining the impact of various statements made during prosecution are not susceptible to broad generalizations; rather, they are best illustrated through examples. The examples show that prosecution history estoppel is losing its potency as a defensive, claim-limiting weapon for accused infringers.

The doctrine of prosecution history estoppel does not necessarily limit the patentee to the literal meaning of claim elements added by amendment—even an amendment necessary to distinguish cited prior art.¹⁰³ The patent in *Hughes* related to attitude control of a satellite. The patentee invented and claimed a satellite capable of achieving a fixed attitude, or spatial orientation, with respect to a fixed point on earth. During prosecution, the examiner rejected the claims, based in part on the McLean patent. McLean disclosed a self-contained, self-guiding space vehicle for steering on a collision course with a moving target.

Williams (the patentee in *Hughes*) re-wrote the claims to distinguish over McLean. The claims, as re-written, differed from McLean's device in basically two respects. First, the re-written claims required that the attitude information be sent to an external location, processed, and returned to the satellite as "real-time" control signals (i.e., command signals that are executed immediately).¹⁰⁴ In contrast, McLean's device was self-contained. Second, the re-written claims required that the satellite attitude data be computed "with reference to a fixed external coordinate system" whereas McLean's device tracked a moving target by hitting the target with an infrared beam and detecting the reflection.¹⁰⁵ In his argument to the examiner, Williams emphasized that the cited McLean reference did not indicate satellite attitude "‘with reference to a fixed external coordinate system,’" and the re-written claims were allowed.¹⁰⁶

The accused devices in *Hughes* featured an on-board computer that stores the control signals for later, properly-timed execution instead of the claimed invention's ground-based computer that transmits the control signals, at the proper time, for immediate execution. But the accused devices did indicate satellite attitude with reference to a fixed external coordinate system, as required in the claim.¹⁰⁷

In *Hughes*, the argument for prosecution history estoppel was

to zero.").

103. *Id.* at 1362-63.

104. *Id.* at 1355-56.

105. *Id.*

106. *Id.* (emphasis in original).

107. *Id.* at 1363-66.

clear: The "external-location" feature had been added to the claims by amendment and to overcome prior art.¹⁰⁸ The prior art devices did not transmit the satellite attitude data to an external location, and neither did the accused satellites. Even so, the *Hughes* court extended the claims to cover the accused satellites.

Did the *Hughes* court simply overlook the external-location feature? No, but the Federal Circuit in *Hughes* did not regard the feature of sending the data to an external location as critical to distinguishing the claim over the prior art. In arguing to distinguish the cited references during prosecution, Williams emphasized that the claimed invention computed the orientation data relative to a fixed external coordinate system. Apparently, Williams did not argue that the claimed invention was patentable because it transmitted data to an external location. Because the patentee (1) did not base an argument for patentability on the external-location feature, and (2) specifically did base the argument for patentability on a different feature, added to the claim contemporaneously with the external-location feature, the claim was entitled to a range of equivalents with respect to the external-location feature.¹⁰⁹

Under *Hughes*, courts must analyze prosecution history estoppel with a focus on determining not only what the patentee argued, but also what was actually needed to establish patentability. Nevertheless, prosecution history estoppel requires the patentee to rely on what was actually said and done during prosecution, not on what could have been said or done, to obtain the patent.¹¹⁰

For example, in *Kinzenbaw v. Deere & Co.*,¹¹¹ the prosecution history of the litigated patent was similar to that of the Williams patent in *Hughes*. However, the *Kinzenbaw* court rejected the same argument that it had accepted in *Hughes*: that the claim should be entitled to a range of equivalents with respect to one of two claim limitations added to overcome a prior art rejection because that limitation was not necessary to establish patentability.¹¹² In *Kinzenbaw*, as in *Hughes*, the patentee added two claim limitations, by amend-

108. *Id.* at 1355-56, 1363.

109. *Id.* at 1355-56.

110. If the estoppel operates only to prevent the claim from extending to cover the prior art references upon which the examiner based the rejection, then it is no estoppel at all because the claim can never be extended to cover the prior art, regardless of amendments and arguments during prosecution. See 4 D. CHISUM, *supra* note 3, § 18.05[3] ("This position is clearly too lenient for it would extend file wrapper estoppel only into an area where it is not needed.").

111. 741 F.2d 383 (Fed. Cir. 1984).

112. *Id.* at 389.

ment, to overcome prior art cited by the PTO Examiner. Further, in *Kinzenbaw*, as in *Hughes*, the court acknowledged that one of the added limitations was not necessary to establish patentability. The accused device in *Kinzenbaw*, like the accused device in *Hughes*, lacked only the limitation that was added unnecessarily.¹¹³ Nevertheless, in *Kinzenbaw*, contrary to the decision in *Hughes*, the Federal Circuit refused to allow the claim to cover the accused device through the doctrine of equivalents.¹¹⁴ The court supported its decision by stating:

We decline to undertake the speculative inquiry whether, if Pust had made only that narrowing limitation in his claim, the examiner nevertheless would have allowed it. The file on Pust's patent, to which the public had access, explicitly showed that in response to the examiner's rejection, Pust had narrowed his claims to a planter in which "the radius of the wheel . . . [is] less than the radius of the disc." Deere offers no convincing reason why a competing manufacturer was not justified in assuming that if he built a planter in which the radius of the wheels was greater than that of the disc, he would not infringe the Pust patent.¹¹⁵

Despite the apparent conflict between *Hughes* and *Kinzenbaw*, the two cases can be reconciled. During the prosecution of the patent in *Hughes*, the patentee (then applicant) not only added the relevant claim limitations, but also filed written remarks accompanying the amendment and emphasizing one of the added limitations. In contrast, the patentee in *Kinzenbaw* added the limitations after an interview with the examiner.¹¹⁶

Perhaps the *Kinzenbaw* court could have determined, based on its own independent assessment of the cited prior art, that one of the features added to the claims during prosecution was unnecessary. But the court apparently could point to nothing included in the patentee's prosecution history that would lead a person studying that prosecution history to that conclusion. Therefore, the *Kinzenbaw* court declined to insert its own conclusion as to whether the added limitation was necessary where the patentee had provided no support

113. *Id.* at 388-89 ("Some evidence supports [plaintiff] Deere's contention that the size of the gauge wheel is irrelevant and that [defendant Kinzenbaw's] larger gauge wheel is equivalent to [plaintiff Deere's] smaller gauge wheel.").

114. *Id.* at 389.

115. *Id.*

116. See *Hughes*, 717 F.2d at 1354-56; *Kinzenbaw*, 741 F.2d at 388.

for such a conclusion.¹¹⁷

In *Kinzenbaw*, the court narrowed the litigated claims because of a lack of remarks accompanying the amendment.¹¹⁸ The court record contained nothing to indicate which new claim limitations distinguished the cited prior art. The lack of such accompanying remarks, however, did not have a narrowing effect in *Hi-Life*,¹¹⁹ where, just as in *Kinzenbaw*, the patentee amended the claim as suggested by the examiner in a telephone interview. In *Hi-Life*, the trial court held that, because of the patentee's amendment, prosecution history estoppel foreclosed any resort to the doctrine of equivalents.¹²⁰ The Federal Circuit remanded the case for findings on equivalents, because, based on the court's view of the prosecution, the added limitation was not necessary to avoid prior art.¹²¹ The court reached this conclusion even though during prosecution of the patent in *Hi-Life* the examiner had noted that the added limitation "is not taught by the prior art *and renders the claims patentable*."¹²²

The claimed invention in *Hi-Life* was a waterbed mattress containing a floating wave dampener made from an insert of open-cell foam. The wave dampener floated by virtue of a material of low specific gravity disposed throughout the dampener's body. The prior art cited by the examiner included a reference that taught disposing a lightweight material in foam, but the reference did not disclose that teaching in combination with a waterbed. The amendment added the following language: "a material of low specific gravity disposed throughout its body, said material of low specific gravity causing the foam to float in the liquid, above the bottom wall of the container, close to the top wall of the container."¹²³

The accused waterbed mattress in *Hi-Life* included both the foam insert and the low-specific-gravity material, but instead of having the low-specific-gravity material "disposed throughout" the foam, as in the claim, the accused device featured the low-specific-

117. *Kinzenbaw*, 741 F.2d at 388-89. The court did not want to require that others be able to read things in the prosecution that were not provided by the patentee: "Deere offers no convincing reason why a competing manufacturer was not justified in assuming that if he built a planter in which the radius of the wheels was greater than that of the disc, he would not infringe [Deere's] patent." *Id.* at 389. *Accord* *Prodyne Enters., Inc. v. Julie Pomerantz, Inc.*, 743 F.2d 1581, 1583 (Fed. Cir. 1984) (quoting *Kinzenbaw*).

118. *Kinzenbaw*, 741 F.2d at 388-89.

119. *Hi-Life Prods. v. American Nat'l Water-Mattress Corp.*, 842 F.2d 323 (Fed. Cir. 1988).

120. *Id.* at 325.

121. *Id.* at 326.

122. *Id.* (Davis, J., dissenting) (emphasis added).

123. *Id.* at 325-26.

gravity material attached as a sheet to the bottom of the foam insert. The cited prior art did not disclose a waterbed mattress containing a foam wave dampener to which a sheet of low-specific-gravity material was attached, and neither the patentee nor the examiner had referred to such a configuration during prosecution.¹²⁴

Further, the patentee did not argue that the invention was patentable because it featured low-specific-gravity material "disposed throughout," rather than attached to, the foam insert. Thus, the prosecution history did not address the question of whether the claims could extend to cover configurations such as the accused device.¹²⁵

Coupled with related cases, the *Hi-Life* decision shows that the Federal Circuit has elected to neutralize prosecution history estoppel. In recent decisions such as *Loctite* and *Hi-Life*, the court has given prosecution history estoppel little more claim-limiting effect than that already provided by the cited prior art.¹²⁶ *Corning Glass Works v. Sumitomo Electric USA, Inc.*¹²⁷ is an exceptional example of this trend. The claim in *Corning* defined an optical waveguide with (1) a cladding layer made of pure fused silica and "doped" fused silica, and (2) "a core formed of fused silica to which a dopant . . . has been added to a degree in excess of that of the cladding."¹²⁸ In arguing to distinguish prior art, the patentee in *Corning* had stated that "a doping material for purposes of increasing the index of re-

124. *Id.*

125. *Id.* Compare the *Hi-Life* prosecution to that in *Hughes*. The "disposed throughout" feature in *Hi-Life*, like the "external location" feature in *Hughes*, was added by amendment but was not critical to establishing the invention's novelty (i.e., to distinguish the prior art). See also *Loctite Corp. v. Ultraseal Ltd.*, 781 F.2d 861, 867, 869-71 (Fed. Cir. 1985) (stating that where the patentee, in distinguishing a cited reference, had argued that the claim was limited to compositions that function "without additional outside influences," that the issue on remand is whether the claims can be extended through equivalents to cover compositions that use "outside influences" other than those that were specifically disclosed in the cited reference).

126. See also *Specialty Composites v. Cabot Corp.*, 845 F.2d 981, 988 & n.6 (Fed. Cir. 1988), where the court stated in dicta:

The Examiner felt that [the cited reference] inherently disclosed that the recovery rate and equilibrium pressure of a foam could be varied because that patent referred to the possibility of manipulating the physical properties of the foam by controlling the density of the plastic and the size of the pores. . . . Therefore, if [patentee] was trying to assert rights under the doctrine of equivalents to foam earplugs having recovery rates and equilibrium pressures controlled by manipulating the pore size or density of the plastic, the patentee might be estopped.

The "estoppel" contemplated by the *Specialty Composites* court would not limit the claim any further than the prior art already did.

127. 671 F. Supp. 1369 (S.D.N.Y. 1987), *aff'd* 868 F.2d 1251 (Fed. Cir. 1989).

128. *Id.* at 1385-86.

fraction of the core . . . is absolutely essential.”¹²⁹

The accused fiber in *Corning* did not have this “essential” doped-core feature. Instead of having a mostly pure cladding around a highly doped core like the patented fiber, the accused fiber had just the opposite: a highly doped cladding around a core of “substantially pure fused silica.”¹³⁰ But this difference had no practical significance. Whereas the plaintiff-patentee had doped the core to raise its refractive index, the defendants-accused infringers doped the cladding with a different dopant to lower its refractive index. The defendants thus achieved the same result as the inventors, and the court ruled that the accused fiber met the *Graver Tank* test for equivalency.¹³¹

But what about prosecution history estoppel? After all, the patentee had argued that it was “absolutely essential” to dope the core and to raise the refractive index of the core—and the accused infringer did neither of these things. As in *Hughes*, the *Corning* court concluded that the patentee’s remarks in this regard were unnecessary to distinguish the prior art.¹³² Therefore, the claim covered the accused fiber through the doctrine of equivalents.

The court’s extreme leniency toward the patentee in *Corning* is difficult to reconcile with *Hughes* and *Kinzenbaw*. The *Corning* court’s unwillingness to apply prosecution history estoppel is best explained by observing that the invention in *Corning*, an optical waveguide fiber, was a pioneering invention,¹³³ whereas the invention in *Kinzenbaw* was an improvement in a crowded art,¹³⁴ and the invention in *Hughes*, although a significant breakthrough,¹³⁵ was not a pioneering invention.¹³⁶ Since the *Corning* patents covered a pioneering invention, these patents were entitled to a broad range of equivalents.¹³⁷

In *Kinzenbaw*, in contrast to *Corning*, prosecution history estoppel prohibited a finding of infringement by equivalents even

129. *Id.* at 1388-89 (emphasis omitted).

130. *Id.* at 1386.

131. *Id.* at 1399-1400.

132. *Id.* at 1398.

133. *Id.* at 1376-78.

134. *Kinzenbaw*, 741 F.2d at 389.

135. *Hughes*, 717 F.2d at 1352-56.

136. *Id.* at 1362.

137. See *Texas Instruments, Inc. v. International Trade Comm’n*, 805 F.2d 1558, 1563 (Fed. Cir. 1986) (“It has long been recognized that the range of permissible equivalents depends upon the extent and nature of the invention, and may be more generously interpreted for a basic invention than for a less dramatic technological advance.”).

though the difference between the accused device and that claimed was of little or no practical significance.¹³⁸ Such also was the case in *Pennwalt*. Regardless of the element-by-element dispute discussed in Part I, the outcome of the *Pennwalt* decision is quite justifiable in terms of prosecution history estoppel.

In *Pennwalt*, the patented machine and the accused machine were very similar (fruit sorters). Each machine carried items along a conveyor, from a color-detect station to a weigh station, and beyond. Each machine had means to correlate the color-detect data with a certain item, so that at the weigh station the machine would "know" the color of the item being weighed, and could correctly pair the weight data with the color-detect data for each item.¹³⁹

The manner in which the two machines accomplished the "correlation" differed only slightly, but that difference removed Durand-Wayland's (the accused infringer) machine from the scope of plaintiff *Pennwalt*'s claims. *Pennwalt*'s machine correlated the color-detect data by storing the data in a shift register. The register shifts in concert with the conveyor, shifting the color-detect data in accordance with the position of the item on the conveyor, and shifting the data out of the last stage of the register (to the "processing circuitry") as the item reaches the weigh station. *Pennwalt* described this feature as "position indicating means . . . for generating a signal continuously indicative of the position of the item"¹⁴⁰

In contrast, Durand-Wayland's machine correlated the color-detect data by storing the data in a "color value queue."¹⁴¹ Unlike in *Pennwalt*'s shift register, the data within the "color-value queue" is not shifted. Instead, a pointer indicates the location that contains the color data corresponding to the next item to reach the weigh station. Like *Pennwalt*'s shift register, Durand-Wayland's pointer advances in concert with the conveyor.¹⁴²

As originally submitted, *Pennwalt*'s claims did not require the position-indicating means.¹⁴³ The prior art cited by the PTO Examiner included the Ramsay patent, which discloses a device for transporting cans past a series of inspection stations. The Ramsay device included memories called "position indicators," which indicate the

138. *Kinzenbaw*, 741 F.2d at 389.

139. See 225 U.S.P.Q. (BNA) at 550, 560 (district court description of the claimed machine and of the accused machine).

140. *Id.* at 564-65.

141. *Id.* at 569.

142. *Id.*

143. *Pennwalt*, 833 F.2d at 937.

can's position relative to an inspection station, but do not keep track of the cans as they are transported between inspection stations.¹⁴⁴

During patent prosecution, Pennwalt added the position-indicating means,¹⁴⁵ and the Federal Circuit concluded, from its own independent evaluation of the prosecution, that "[t]he addition of that element [the position-indicating means] was crucial to patentability."¹⁴⁶ Thus, Pennwalt could not extend the claim, through equivalents, to cover an accused device that lacked the "crucial" position-indicating means.

IV. CONCLUSIONS

Today, in contrast to the time of *Graver Tank*, courts apply the doctrine of equivalents almost routinely. The doctrine's basic purpose is no longer as closely tied to the individual equities of a case as implied by *Graver Tank*. The modern doctrine of equivalents operates to help a patentee enforce his patent against an accused infringer when the patent claim does not cover the accused device, but the patented invention and the accused device are practically and technically the same thing. Courts have struggled to strike the proper balance of protection. On one hand, if courts fail to accord patented inventions a sufficient scope of protection, industry will seek alternative forms of protection. For example, the business community may conceal inventions as trade secrets. The resulting decrease in disclosed discoveries would slow technological developments. On the other hand, overprotection of patented inventions would also stifle innovation by encouraging companies to litigate marginal claims, thus siphoning off funding and increasing the cost of market entry.

It is beyond the scope of this paper to determine on which side of the balance the patent law presently rests, but a few brief observations about the history of the patent law and the doctrine of equivalents may explain the Federal Circuit's present controversy over the doctrine of equivalents. The legal history shows that the test for patent infringement has become more precise and less dependent on equitable factors as patents and technology have grown in importance.

The first patent law required that patent applications be re-

144. See 225 U.S.P.Q. (BNA) at 562 (district court's discussion of the prior art of record in the prosecution).

145. *Pennwalt*, 833 F.2d at 937-39.

146. *Id.* at 937. Furthermore, the accused machines most likely were in the prior art: "[The] prior art . . . like the accused machines, stores the information with respect to sorting criteria in memories, but [does] not 'continuously' track the location." *Id.* at 938.

viewed by a committee of three persons.¹⁴⁷ This requirement soon overburdened the committee, and, in 1793, Congress decided to grant patents routinely where the applicant met certain formalities.¹⁴⁸ The applicant for patent had to pay a fee and submit a written description of the invention, but the applicant did not have to submit a claim. Without any patent claim, the court (or jury) decided infringement by determining whether the accused device was "substantially similar" to the device described in the patent.¹⁴⁹

Unlike the 1793 law, the Patent Act of 1836¹⁵⁰ required the applicant to submit patent claims. The Act also required the newly created Patent Office to examine those claims.¹⁵¹ The claiming requirement came "at a time of burgeoning industrial activity and creativity, growth in patent filings and, inexorably, increasing infringement litigation."¹⁵² Also, during this period of increasing technological development and technology-related litigation, the test for patent infringement became slightly more precise than the previous test of "substantial similarity."¹⁵³

With the Patent Act of 1870,¹⁵⁴ patent claims began to describe the invention more specifically and became an important measure of the scope of the patent right.¹⁵⁵ In infringement litigation, the courts focused on the patent claim instead of the specification. Thus, the Supreme Court stated the classic "same-same-same" formulation of the doctrine of equivalents in *Machine Co. v. Murphy*.¹⁵⁶

Since the 1870's, patent claims have become increasingly detailed and precise. Presently, the doctrine of equivalents determines the equivalence of an accused device to another device described in the particular patent claim. We can naturally expect the doctrine's precision to increase concomitantly with that of the claims to which it is applied. Moreover, when industry increases technological activity, patents and patent litigation become more important. The law reacts by defining patent rights with more certainty.

147. Patent Act of 1790, ch. 7, § 1, 1 Stat. 109, 109-10 (1790).

148. Patent Act of 1793, ch. 11, § 3, 1 Stat. 318, 321-22 (1793). See *Pennwalt*, 833 F.2d at 957 (Newman, J., commentary) (discussing history of patent law).

149. *Odiorne v. Winkley*, 18 F. Cas. 581, 582 (C.C.D. Mass. 1814) (No. 10,432).

150. Patent Act of 1836, ch. 357, 5 Stat. 117 (1836).

151. *Id.*

152. *Pennwalt*, 833 F.2d at 958 (footnote omitted) (Newman, J., commentary).

153. See *Evans v. Eaton*, 20 U.S. (7 Wheat.) 356 (1822).

154. Patent Act of 1870, ch. 230, 16 Stat. 198 (1870).

155. See, e.g., *White v. Dunbar*, 119 U.S. 47, 52 (1886) (emphasizing the importance of precise claim language).

156. 97 U.S. 120 (1878).

Businesses place great emphasis on patents, intellectual property in general, and on patent litigation.¹⁵⁷ Many businesses regard patent litigation as a highly lucrative endeavor.¹⁵⁸ In these circumstances, certainty in the law defining patent rights is critical. To lower the stakes in patent litigation, or at least to enable businesses to evaluate a potential litigation more accurately, businesses want and need reliable guides to help predict whether a court would find infringement in different situations. If unrestrained, the doctrine of equivalents will deprive businesses of such predictability.

Granted, the doctrine inevitably lengthens patent litigation and increases the litigation's cost and complexity because the doctrine often requires technical experts. Nonetheless, many of the reasons for the doctrine so eloquently stated in *Graver Tank* still apply. If all patentees could not count on the doctrine of equivalents, they would be forced to predict equivalents yet to be developed. Such a burden would be ridiculous. Moreover, patents would swiftly decline in value.

On the other hand, certainty and predictability as to questions of patent infringement are paramount in these days of huge verdicts and permanent injunctions which shut down major portions of businesses.¹⁵⁹ The doctrine of equivalents continues to evolve as the Federal Circuit attempts to give businesses clearer rules governing exploitation of that recently rediscovered corporate crown jewel (or corporate sabre), the patent. If this move toward certainty is a claim-limiting trend, then at least it is offset by the concurrent decline of a different claim-limiting device, prosecution history estoppel.

157. *The New High-Tech Battleground*, *supra* note 7, at 1, col. 8.

158. *The New High-Tech Battleground*, *supra* note 7, at 1, col. 8.

159. See, e.g., *E.I. Du Pont de Nemours & Co. v. Phillips Petroleum Co.*, 835 F.2d 277, 278-79 (Fed. Cir. 1987) (permanent injunction stayed pending appeal would have halted \$200 million annual business). See also *Polaroid Corp. v. Eastman Kodak Co.*, 641 F. Supp. 828 (D. Mass. 1985), *aff'd*, 789 F.2d 1556 (Fed. Cir. 1986), *cert. denied*, 479 U.S. 850 (1986); *Hybritech, Inc. v. Monoclonal Antibodies, Inc.*, 802 F.2d 1367 (Fed. Cir. 1986). Damages in the *Polaroid* case are estimated at \$5.7 billion, and in *Hybritech*, the permanent injunction forced Monoclonal Antibodies, Inc., to stop selling products accounting for 80 percent of the company's revenue and to lay off 30 percent of its work force. *The New High-Tech Battleground*, *supra* note 7, at 1, col. 6.

